

Hazards are processes that produce danger to human life and infrastructure. Risks are the potential or possibilities that something bad will happen because of the hazards. Disasters are that quite unpleasant result of the hazard occurrence that caused destruction of lives and infrastructure. Hazards, risks, and disasters have been coming under increasing strong scientific scrutiny in recent decades as a result of a combination of numerous unfortunate factors, many of which are quite out of control as a result of human actions. At the top of the list of exacerbating factors to any hazard, of course, is the tragic exponential population growth that is clearly not possible to maintain indefinitely on a finite Earth. As our planet is covered ever more with humans, any natural or human-caused (un-natural?) hazardous process is increasingly likely to adversely impact life and construction systems. The volumes on hazards, risks, and disasters that we present here are thus an attempt to increase understandings about how to best deal with these problems, even while we all recognize the inherent difficulties of even slowing down the rates of such processes as other compounding situations spiral on out of control, such as exploding population growth and rampant environmental degradation.

Some natural hazardous processes, such as volcanos and earthquakes that emanate from deep within the Earth's interior, are in no way affected by human actions, but a number of others are closely related to factors affected or controlled by humanity, even if however unwitting. Chief among these, of course, are climate-controlling factors, and no small measure of these can be exacerbated by the now obvious ongoing climate change at hand (Hay, 2013). Pervasive range and forest fires caused by human-enhanced or induced droughts and fuel loadings, mega-flooding into sprawling urban complexes on floodplains and coastal cities, biological threats from locust plagues, and other ecological disasters gone awry; all of these and many others are but a small part of the potentials for catastrophic risk that loom at many different scales, from the local to planet girdling.

In fact, the denial of possible planet-wide catastrophic risk (Rees, 2013) as exaggerated jeremiads in media landscapes saturated with sensational science stories and end-of-the-world Hollywood productions is perhaps quite understandable, even if simplistically short-sighted. The "end-of-days" tropes promoted by the shaggy-minded prophets of doom have been with us for centuries, mainly because of Biblical verse written in the early Iron Age during remarkably pacific times of only limited environmental change. Nowadays however, the

Armageddon enthusiasts appear to want the worst for the rest of us in order to validate their death desires and justify their holy books. Unfortunately we are all entering times when just a few individuals could actually trigger societal breakdown by error or terror, if Mother Nature does not do it for us first. Thus we enter contemporaneous times of considerable peril that present needs for close attention.

These volumes we address here about hazards, risks, and disasters are not exhaustive dissertations about all the dangerous possibilities faced by the ever-burgeoning human populations, but they do address the more common natural perils that people face, even while we leave aside (for now) the thinking about higher-level existential threats from such things as bio- or cyber-technologies, artificial intelligence, ecological collapse, or runaway climate catastrophes.

In contemplating existential risk (Rossbacher, 2013) we have lately come to realize that the new existentialist philosophy is no longer the old sense of disorientation or confusion at the apparently meaninglessness or hopelessly absurd worlds of the past. Instead it is an increasing realization that serious changes by humans appear to be afoot that even threatens all life on the planet (Kolbert, 2014; Newitz, 2013). In the geological times of the Late Cretaceous an asteroid collision with Earth wiped out the dinosaurs and much other life; at the present time by contrast, humanity itself appears to be the asteroid.

Misanthropic viewpoints aside, however, an increased understanding of all levels and types of the more common natural hazards would seem a useful endeavor to enhance knowledge accessibility, even while we attempt to figure out how to extract ourselves and other life from the perils produced by the strong climate change so obviously underway. Our intent in these volumes is to show the latest good thinking about the more common endogenetic and exogenetic processes and their roles as threats to everyday human existence. In this fashion, the chapter authors and volume editors have undertaken to show overviews and more focused assessments of many of the chief obvious threats at hand that have been repeatedly shown on screen and print media in recent years. As this century develops, we may come to wish that these examples of hazards, risks, and disasters are not somehow eclipsed by truly existential threats of a more pervasive nature. The future always hangs in the balance of opposing forces; the ever-lurking, but mindless threats from an implacable nature, or heedless bureaucracies countered only sometimes in small ways by the clumsy and often febrile attempts by individual humans to improve our little lots in life. Only through improved education and understanding will any of us have a chance against such strong odds; perhaps these volumes will add some small measure of assistance in this regard.

Specifically in this volume, earthquakes are an occurrence fairly well understood by many educated people in the world, even if they live in seismically quiescent regions. Nonetheless in seismically active areas, because of the common long temporal gaps between many events, it is common for people to overlook the necessity for strong building codes and proper behavior in the event

of major seismic events. This is especially true where the twin scourges of poverty and corruption combine to produce shoddy construction and multiple levels of bribery to cut construction costs. The result can be atrociously inflated casualty rates and the expunging of whole regions of buildings in major seismic events. Certainly the most tragic result in these cases is the pancake flattening of so many schools with children in them, as happened in Pakistan in 2005 and China in 2008. It would seem that any society that cannot at least protect its most vulnerable children from these terrible hazards cannot presume to have much of a secure future.

The chapters presented in this volume represent the best current information that Editor Max Wyss has been able to gather together from his many colleagues as they collectively attempt to bring greater enlightenment about the so-deadly processes of seismicity. I was especially impressed by the ongoing attempts to predict at least some aspects of the potentials for further seismic effects in the future in especially vulnerable areas. This reflects well upon this community of seismic experts, whom many might expect to be intimidated into silence by the travesty of the Italian court's decision to convict a group of scientists of manslaughter for 6-year prison sentences in relation to the 2009 earthquake in L'Aquila for failing to adequately warn of the impending event. The communication of risk is what this volume is most concerned with, and in that sense, this volume adds to the effort by scientists to continue to try to improve communications about hazards, risks, and disasters. I am pleased with the result, even while we all recognize the great difficulties that science has to provide objective information about natural hazards that the public can actually use to modify human behavior—a most difficult task indeed. Perhaps this volume will succeed in at least a small measure.

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## REFERENCES

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